Kingspan Insulation Limited
Pembridge
Leominster
Herefordshire HR6 9LA

Tel: 01544 388 601
e-mail: info@kingspaninsulation.co.uk
website: www.kingspaninsulation.co.uk

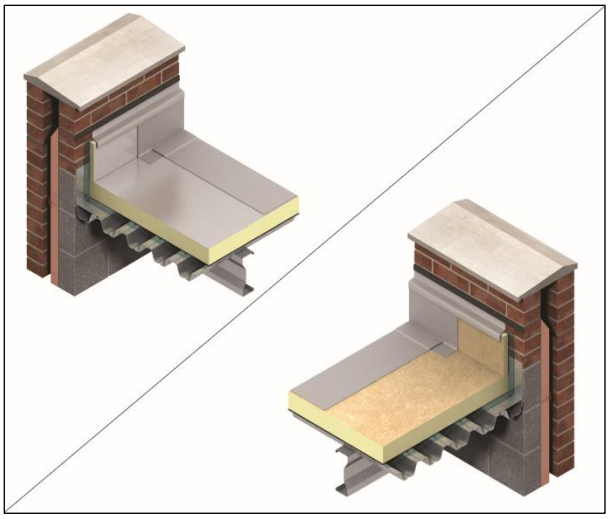
Agrément Certificate
16/5332
Product Sheet 1

KINGSPAN THERMAROOF RANGE INSULATION

THERMAROOF TR26, THERMATAPER TT46, THERMAROOF TR27 AND THERMATAPER TT47 ROOFING BOARDS

This Agrément Certificate Product Sheet(1) relates to Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards, for use as a thermal insulation layer on flat concrete, metal, or timber roof decks with limited access. Thermataper TT46 and Thermataper TT47 are also for use on zero pitch roofs to create or improve falls. They are for use in conjunction with a vapour control layer and mechanically or adhesively fixed roof waterproofing systems in domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.



CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Thermal performance — the TR26 and TT46 products have a declared thermal conductivity (λ_D) of 0.022 $W \cdot m^{-1} \cdot K^{-1}$ and the TR27 and TT47 products have declared thermal conductivities (λ_D) of 0.024 $W \cdot m^{-1} \cdot K^{-1}$ to 0.027 $W \cdot m^{-1} \cdot K^{-1}$ depending on the thickness (see section 6).

Condensation — the products can contribute to limiting the risk of condensation (see section 7).

Strength and stability — when installed on suitable substrates using appropriate fixings, the products can adequately transfer maintenance traffic loads and wind loads to the roof deck (see section 8).

Behaviour in relation to fire — the overall fire rating of any roof containing the products will depend on the type of deck and the nature of the roof waterproofing (see section 9).

Durability — under normal service conditions, the products, when used as thermal insulation in the roof systems described in this Certificate, will have a life at least as long as that of the roof waterproof covering (see section 12).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

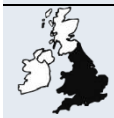
Date of Second issue: 16 November 2022

Originally certificated on 30 June 2016

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards, if installed, used, and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	**A1**	**Loading**
Comment:		The products can contribute to satisfying this Requirement. See section 8.1 of this Certificate.
Requirement:	**B4(2)**	**External fire spread**
Comment:		Roofs incorporating the products can satisfy this Requirement. See sections 9.1 and 9.2 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The products can contribute to satisfying this Requirement. See sections 7.1 and 7.4 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The products can contribute to satisfying this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The products are acceptable. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Regulation:	**26C**	**Target primary energy rates for new buildings (applicable to England only)**
Comment:		The products can contribute to satisfying these Regulations. See section 6 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)**	**Fitness and durability of materials and workmanship**
Comment:		The products are acceptable. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1	Structure
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 1.1.1[(1)(2)], 1.1.2[(1)(2)] and 1.1.3[(1)(2)]. See section 8.1 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		Roofs incorporating the products can satisfy this Standard, with reference to clause 2.8.1[(1)(2)]. See sections 9.1 and 9.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The products can contribute to a roof satisfying this Standard, with reference to clauses 3.15.1[(1)(2)], 3.15.4[(1)(2)] and 3.15.5[(1)(2)]. See sections 7.1 and 7.5 of this Certificate.

Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The products can contribute to satisfying these Standards, with reference to clauses, or parts of, 6.1.1(1), 6.1.2(2), 6.1.6(1), 6.2.1(1)(2), 6.2.3(1), 6.2.4(2), 6.2.5(2), 6.2.6(1), 6.2.7(1), 6.2.8(1)(2), 6.2.9(1)(2), 6.2.10(1)(2), 6.2.11(1)(2), 6.2.12(2) and 6.2.13(1)(2). See sections 6.1 and 6.2 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The products can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the products can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1)(2) [Aspects 1(1)(2) and 2(1)], 7.1.6(1)(2) [Aspects 1(1)(2) and 2(1)] and 7.1.7(1)(2) [Aspect 1(1)(2)]. See section 6.1 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments made in relation to the products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1(1)(2) and Schedule 6(1)(2).

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	**23**	**Fitness of materials and workmanship**
Comment:		The products are acceptable. See section 12.1 and the *Installation* part of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The products can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation:	**30**	**Stability**
Comment:		The products can contribute to satisfying this Regulation. See section 8.1 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		Roofs incorporating the products can satisfy this Regulation. See sections 9.1 and 9.2 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation:	**40(2)**	**Target carbon dioxide emission rate**
Comment:		Roofs incorporating the products can satisfy these Regulations. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**43B**	**Nearly zero-energy requirements for new buildings**
Comment:		The products can contribute to satisfying this Regulation. See sections 6.1 and 6.2 of this Certificate.

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.5) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards, if installed, used, and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs, and balconies*.

UKCA and CE marking

The Certificate holder has taken the responsibility of UKCA/CE marking the products in accordance with designated Standard BS EN 13165 : 2012 and harmonised European Standard EN 13165 : 2012.

Technical Specification

1 Description

1.1 Thermaroof TR26 and Thermataper TT46 Roofing Boards are polyisocyanurate (PIR) insulation boards with composite foil-facings on both sides. Thermaroof TR27 and Thermataper TT47 Roofing Boards are PIR insulation boards with glass-tissue-facing on both sides.

1.2 The boards have the nominal characteristics shown in Table 1.

Table 1 Nominal characteristics(1)

Characteristic (unit)	Thermaroof TR26/TR27	Thermataper TT46/TT47
Length (mm)	2400 and 600(2)	1200
Width (mm)	1200	1200
Thickness (mm)	25 to 160 in 5 mm increments	25 to 160 in 5 mm increments
Compressive strength at 10% compression (kPa)	150	150
Edge detail	Square	Square

(1) Other board sizes within this range may be available on request.
(2) For TR27.

1.3 Thermataper TT46 and Thermataper TT47 are available in tapered versions for falls of 1:120, 1:80, 1:60, 1:40 and 1:30.

2 Manufacture

2.1 Raw materials are injected onto the lower facer on a conveyor belt. The exothermic reaction expands the foam, which then meets the upper facer. An automated process cures and cuts the products to the required size.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Kingspan Insulation Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by CIBSE Certification Ltd (Certificate 0001QMS).

3 Delivery and site handling

3.1 The boards are delivered to site in packs, shrink-wrapped in polythene. Each pack carries a label bearing the Certificate holder's name, product code, batch number and the BBA logo incorporating the number of this Certificate.

3.2 The boards must be stored flat, off the ground on a clean, level surface under cover to protect them from precipitation, moisture, high winds, and mechanical damage.

3.3 The boards must be protected from prolonged exposure to sunlight by storing either under cover or by covering with opaque polythene sheets or waterproof tarpaulin. Where possible, the boards should be stored inside a building.

3.4 Wet boards should not be used.

3.5 The boards must not be exposed to naked flame or other ignition sources.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards.

Design Considerations

4 General

4.1 Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards are suitable for use as a fully supported thermal insulation layer on flat roofs with concrete, timber, and profiled metal roof decks (see section 8.11), in conjunction with a suitable roof waterproofing membrane system (see section 4.4), with limited access only (see section 4.5).

4.2 Decks should be designed in accordance with the relevant clauses of either BS 6229 : 2018 or BS EN 13956 : 2012 and, where appropriate, *NHBC Standards* 2022, Chapter 7.1.

4.3 Roofs should incorporate an Air and Vapour Control Layer (AVCL) below the products which is compatible with both the products and the waterproofing system. Advice should be sought from the Certificate holder.

4.4 Thermaroof TR26 and Thermataper TT46 Roofing Boards are for use with mechanically fixed single-ply waterproof membranes which are the subject of a current BBA Certificate and laid in accordance with that Certificate.

4.5 Thermaroof TR27 and Thermataper TT47 Roofing Boards are for use with one of the following waterproofing specifications:

- built-up specifications including reinforced bitumen membranes to BS 8747 : 2007 in accordance with the recommendations of Table 5, and installed to the relevant clauses of BS 8217 : 2005
- single ply membranes, which are the subject of a current BBA Certificate, laid in accordance with the requirements of that Certificate, and the manufacturer's recommendations
- other waterproofing systems, including liquid-applied waterproofing, which are the subject of a current BBA Certificate, laid in accordance with, and within the limitations imposed by, that Certificate.

4.6 Limited access roofs are defined for the purpose of this Certificate as those roofs subject only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc (see also section 8.12).

4.7 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80 and a maximum of 1:6 as defined in BS 6229 : 2018.

4.8 For design purposes, on flat roofs twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including overall and local deflections, direction of falls etc.

4.9 Tapered boards may be used where appropriate to achieve the minimum finished falls required. If using the tapered insulation board, a fall of 1:60 is likely to achieve at least 1:80 post construction fall.

5 Practicability of installation

The products are designed to be installed by a competent general builder, or a contractor, experienced with these types of products.

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2019, using the appropriate declared thermal conductivity (λ_D) values as shown in Table 2 of this Certificate.

Table 2 Declared thermal conductivity (λ_D)

Product	Insulation thickness (mm)	Declared thermal conductivity, λ_D ($W \cdot m^{-1} \cdot K^{-1}$)
TR26 and TT46	25 to 160	0.022
TR27 and TT47	< 80	0.027
	≥ 80 < 120	0.025
	≥ 120	0.024

6.2 The U value of a completed roof will depend on the thickness of insulation used, the number and type of fixings and the insulating value of other roof components/layers. Example U values of roofs incorporating the products are shown in Table 3.

Table 3 Example U values(1) for Thermaroof TR26 and Thermaroof TR27 — mechanically fixed

U value ($W \cdot m^{-2} \cdot K^{-1}$)	Deck construction/insulation thickness (mm)					
	Concrete(2)(5)		Timber(3)(5)		Metal(4)(5)	
	TR26	TR27	TR26	TR27	TR26	TR27
0.13	160	-	155	-	160	-
0.15	140	150	135	145	140	155
0.16	130	140	125	135	130	145
0.18	115	125	110	120	120	130
0.20	105	120	100	110	105	120
0.25	85	95	75	90	85	95

(1) Nearest available thickness.
(2) 150 mm concrete deck (λ = 1.33 $W \cdot m^{-1} \cdot K^{-1}$), AVCL, insulation, mechanically fixed single-ply waterproofing membrane.
(3) 12.5 mm plasterboard (λ = 0.25 $W \cdot m^{-1} \cdot K^{-1}$), 150 mm timber joists (12.5%)/air cavity (87.5%), 18 mm plywood decking (λ = 0.13 $W \cdot m^{-1} \cdot K^{-1}$), AVCL, insulation, mechanically fixed single-ply waterproofing membrane.
(4) Metal deck (λ = 50 $W \cdot m^{-1} \cdot K^{-1}$), AVCL, insulation, mechanically fixed single-ply waterproofing membrane.
(5) Thermally broken tube fixings installed – therefore no fixing correction applied.

Junctions

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7 Condensation

Interstitial condensation

7.1 Roofs will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2021, and the relevant guidance.

7.2 To minimise moisture entering the roof, an AVCL should be used with sealed and lapped joints and be turned up around the insulation and bonded to the waterproofing finish. In the case of single ply membranes, the recommendations of the SPRA Design Guide should be followed.

7.3 For the purposes of assessing the risk of interstitial condensation, the water vapour resistance and water vapour resistivity values may be taken as:

- 80 $MN \cdot s \cdot g^{-1}$ resistance to vapour diffusion of each foil-facing on the boards
- 1 $MN \cdot s \cdot g^{-1}$ resistance to vapour diffusion of each glass-tissue-facing on the boards
- 300 $MN \cdot s \cdot g^{-1} \cdot m^{-1}$ vapour diffusion resistivity of the foam core of the boards; the resistance to vapour transmission of the boards and the AVCL should both be reduced to take account of vapour migration through butted board joints and fixing perforations.

Surface condensation

7.4 In England and Wales, roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.35 $W \cdot m^{-2} \cdot K^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in section 6.3 of this Certificate.

7.5 In Scotland, roofs will adequately limit the risk of surface condensation when the thermal transmittance (U-value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2021. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

8 Strength and stability

8.1 When installed on suitable flat roof decks, using appropriate fixing methods, the products can adequately transfer maintenance traffic loads and negative and positive (suction and pressure) wind loads to the roof deck. Care must be taken to ensure that this loading is not exceeded during construction work.

8.2 For adhesive application of the AVCL and/or insulation products, the substrate must be clean, dry, and free from dust and contaminants, and installation should be in accordance with the instructions of the adhesive manufacturer. The surface of the substrate must have sufficient cohesive strength to resist the specific calculated wind load acting upon the structure.

8.3 Metal deck profiles should give a bonding area of at least 33% of the total projected surface area. Deck stiffeners cannot be counted as a satisfactory bond area, and this should be allowed for in the calculation of the bonded area for a particular application. Confirmation should be sought from the structural metal deck manufacturer for the specific deck profile installed.

8.4 When adhesively fixed, adhesion between the insulation board component and AVCL, and between the insulation boards and overlay, must be adequate to resist the effects of wind suction and thermal cycling likely to be experienced under normal conditions. In areas where high wind speeds can be expected, additional mechanical fixing should be considered, particularly at corners and perimeters. If mechanical fixing is impractical, suitable ballasting may be required. In all cases, the advice of a suitably competent and experienced individual should be sought with the relevant clauses of BS EN 1991-1-4 : 2005 and its UK National Annex.

8.5 The roof construction or immediate substrate to which the insulation boards are fixed, must be structurally sound and have sufficient strength and stability to resist all dead, imposed and wind loads. It must also have adequate resistance to the pull-out forces created by the wind loads acting on the specified fixings used.

8.6 The suitability of the roof construction, and the immediate substrate, to accept the adhesive bond or any specified mechanical fixings, must be checked before installation. For adhesive bonding, daily pull off tests should be carried out. For mechanical fixing, in-situ pull-out or pull-through testing should be performed to determine the maximum safe working load the fixings can resist, unless suitable design data are available for a specific fixing to be used on a new metal substrate. The advice of the Certificate holder should be sought in respect of suitable mechanical fixings or adhesive.

8.7 The type and number of fixings will depend on the roof construction, design, height, location, and topography; the Certificate holder's advice should be sought in this respect, including the minimum number of fixings per board, and a minimum dimension for the washer/stress plate.

8.8 All design analysis must be in accordance with British or European Standards relevant to the construction. All calculations should be carried out and documented by a suitably competent and experienced individual.

8.9 Fixings installed along the edges or at corners of boards should be situated between 50 and 150 mm from the board edge.

8.10 For design purposes, the boards may be assumed to have an allowable compressive strength of 120 kPa at 10% compression.

8.11 Roof waterproof covering systems (see Table 2 for suitable types) must be applied in accordance with the relevant BBA Agrément Certificate and the Certificate holder's instructions.

8.12 The products have not been assessed for use with permanent distributed or concentrated loads, such as air conditioning units, mechanical plants, water tanks, etc. Such loads should be supported directly by the roof structure. The products have not been assessed for use on trafficked roofs, where permanent roof access is required, and the advice of the Certificate holder should be sought in such circumstances.

8.13 When profiled metal decking is used, the boards must be installed in a staggered layout. Where possible, butt joints should occur on a crown. Maximum permissible spans between ribs for the different product thicknesses are given in BS 4841-1 : 2006, Table B1 (reproduced in Table 4 of this Certificate).

Table 4 Maximum clear span

Maximum clear span (mm)		Minimum roofboard thickness (mm)
< 75		25
> 75	≤ 100	30
> 100	≤ 125	35
> 125	≤ 150	40
> 150	≤ 175	45
> 175	≤ 200	50
> 200	≤ 225	55
> 225	≤ 250	60

8.14 When maintenance is required to the roof and/or waterproofing, protective boarding should be laid over the roof surface.

9 Behaviour in relation to fire

9.1 The Certificate holder has declared a reaction to fire classification for the products of Class F to BS EN 13501-1 : 2018.

9.2 The resistance to fire exposure of a built-up roofing system will be dependent on the fire performance of the combined individual components and cannot be predicted from the classification of the insulation alone. The classification of a specific roof system must be confirmed by reference to the requirements of the documents supporting the national Building Regulations.

10 Acoustic performance

Thermaroof TR26 and Thermaroof TR27 Roofing Boards have also been assessed for airborne sound transmission (see examples in Table 5) and rain-generated impact sound reduction (see examples in Table 6). The degree of sound insulation achieved for completed constructions will depend substantially on the design and quality of construction of the roof and their associated flanking elements. Further improvements may be achieved using additional acoustic insulation.

Table 5 Airborne sound transmission

Test method	Method calculated	Substrate deck(1)	Insulation	Waterproofing membrane(1)	Fixing method(1)	Roof inclination	Airborne sound reduction
BS EN ISO 140-3 : 1995, BS 2750-3 : 1995 and BS EN ISO 140-6 : 1998	BS EN ISO 717-1 : 1997	0.7 mm thick galvanized steel deck	80 mm Thermaroof TR26/TR27	single ply	Mechanical	0°	Rw (C;Ctr) = 27 (–1;–3) dB

(1) These items are outside the scope of the Certificate. Specific constructions used should be tested.

Table 6 Rain-generated impact sound reduction

Test method	Substrate deck(1)	VCL(1)	Insulation	Waterproofing membrane(1)	Roof inclination	Rain-generated impact sound reduction
ISO 140-18 : 2006	0.7 mm thick galvanized steel deck	Polyethylene	100 mm Thermaroof TR26	1.2 mm single-ply membrane		LIA = 60.2 dB
	0.7 mm thick profiled metal deck (MF)(3)	1.5 mm bituminous felt (A)(2)	110 mm Thermaroof TR27 (A)(2)	1.2 mm single-ply membrane with a fleece backing (A)(2)	0°	LIA = 56.1 dB
		0.2 mm polyethylene (MF)(3)	110 mm Thermaroof TR27 (MF)(3)			LIA = 57.0 dB
	0.7 mm thick galvanized steel deck	Polyethylene	100 mm Thermaroof TR26	1.2 mm single-ply membrane with a fleece backing	0°	LIA = 57.4 dB

(1) These items are outside the scope of the Certificate. Specific constructions used should be tested.
(2) (A) Adhesively fixed.
(3) (MF) Mechanically fixed.
Note: Copies of above reports can be obtained from the Certificate holder.

11 Maintenance

The products, once installed, do not require any regular maintenance of the insulation layer and have suitable durability provided the roof waterproofing is inspected and maintained at regular intervals (see section 12).

12 Durability

The boards are rot-resistant and durable and under normal service conditions will have a life at least as long as that of the roof waterproof covering.

Installation

13 General

13.1 Thermaroof TR26, Thermataper TT46, Thermaroof TR27 and Thermataper TT47 Roofing Boards must be installed in accordance with this Certificate, the Certificate holder's instructions, and BS 6229 : 2018, BS 8217 : 2005 or the relevant BBA Certificate, depending on the waterproofing to be applied.

13.2 Care should be taken to ensure the deck is graded to the correct falls, is dry, clean, and free from any projections or gaps.

13.3 For tapered boards to be effective in providing a uniform fall, it is essential that the structural deck is true and even. Any hollows, depressions or backfalls found in the roof deck must be rectified prior to laying the insulation.

13.4 The suitability of the substrate deck to accept adhesives and retain mechanical fixings must be checked prior to the work commencing.

13.5 The deck to which the AVCL is to be applied must be level, clean, dry, and sound, and free from dust, grease and other defects which may impair restraint of the insulation boards (ie, adhering and/or mechanically fixing). For adhered systems, all deck joints must be taped and, where necessary, the deck coated with bitumen primer to BS 3416 : 1991.

13.6 Where the specified AVCL is other than a reinforced bitumen membrane or bitumen coated foil, any fixings that penetrate the AVCL should be of the self-sealing type. Advice should be sought from the Certificate holder.

13.7 On multi-storey buildings or in areas subject to high wind loads, additional mechanical fixings may be required, and the advice of the Certificate holder should be sought on any limitations of use.

13.8 The mechanical fixing frequency and pattern should be predetermined in accordance with the Certificate holder's instructions and the relevant clauses of BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005. Each fixing should incorporate a minimum 50 mm by 50 mm square or a 50 mm diameter circular plate countersunk washer, which must not restrain more than one board.

13.9 To prevent moisture being trapped on or in the insulation, it is essential to:

- protect the boards during laying, before the application of the roof waterproofing, or to lay the roof covering at the same time as laying the boards. Boards accidentally wetted must be left to dry out or, if damaged, replaced before application of the waterproof layer
- boards should be installed only when the ambient temperature is above 5°C to prevent condensation.

13.10 Boards can be cut with a sharp knife or fine-toothed saw to fit tightly around projections through the roof.

13.11 Once installed, access to the roof should be restricted in accordance with section 4.6 of this Certificate.

14 Procedure

Thermaroof TR26 and Thermataper TT46 Roofing Boards

General

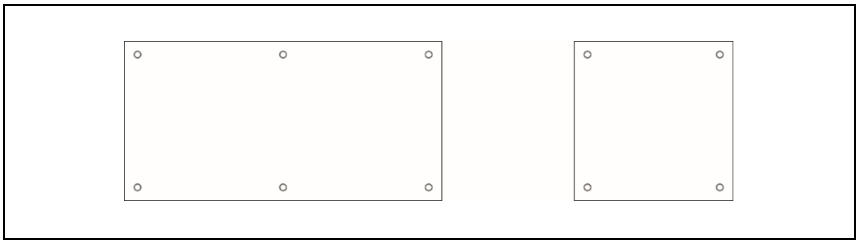
14.1 The specified AVCL should have a minimum of 150 mm side and end laps which should be adequately sealed.

14.2 The AVCL should also be turned up at, but not sealed to, all vertical surfaces which abut the roof, to a minimum height of 250 mm and overhanging the verge or gutter by the same amount.

14.3 Before applying the roof finish, the projecting 250 mm of the AVCL should be turned over the insulation and sealed down to form an envelope.

14.4 A minimum of 6 fixings should be used for 2400 mm by 1200 mm boards, or a minimum of 4 for 1200 by 1200 mm boards. Fixings located along the edges or at the corners of boards should be situated no less than 50 mm, but less than 150 mm, from the board edges (see Figure 1).

Figure 1 Minimum layout of fixings



14.5 The requirements for an additional number of fixings above those noted in section 14.4, should be assessed in accordance with BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005.

14.6 The waterproofing membrane is mechanically fixed, the securing requirements of which should be considered separately.

Timber (eg tongue-and-groove boards) or concrete decks

14.7 Timber or concrete decks should be clean and free from large projections, steps, or gaps.

14.8 The deck should either be graded to allow correct falls to all drainage outlets or the Thermataper TT46 Roofing Boards should be utilised to form the roof falls.

14.9 Thermaroof TR26 Roofing Boards should be laid break-bonded, whilst Thermataper TT46 Roofing Boards are laid using a chequerboard pattern. Both systems should be laid above a suitable AVCL with joints between the insulation boards lightly butted.

Metal decks

14.10 The boards are laid above a suitable AVCL with joints lightly butted.

14.11 Thermaroof TR26 Roofing Boards should be laid break bonded, Thermataper TT46 Roofing Boards are laid using a chequerboard pattern, either with the long edge at right angles to the trough openings or diagonally across the corrugation line. Whichever system is chosen, care must be taken to ensure all joints are supported by the deck.

14.12 The thickness of the board to be used is dependent on the width of the trough openings of the metal deck, as indicated in Table 4.

Thermaroof TR27 and Thermataper TT47 Roofing Boards

Timber decks (eg tongue-and-groove boards, plywood)

14.13 If using a bituminised felt AVCL, the felt is nailed to the deck and the nail heads blanked out with hot bitumen. Laps are sealed using the appropriate grade of bitumen, a polyurethane adhesive, or a suitable solvent based adhesive in accordance with BS 8217 : 2005.

14.14 Care should be taken to ensure continuity of the AVCL at joints, upstands, and roof penetrations.

14.15 Hot bitumen adhesive (maximum temperature of 240°C), polyurethane adhesive or a suitable solvent-based adhesive is applied over the AVCL, and the roofing boards are fully embedded into it and close butted. Thermaroof TR27 Roofing Boards should be laid break-bonded, whilst Thermataper TT47 Roofing Boards are laid using a chequerboard pattern.

14.16 When using non-bituminous waterproofing systems or adhesives, all board joints and edges should be sealed with 50 mm wide aluminium foil adhesive tape, prior to the application of the adhesive system and roof waterproofing membrane.

Concrete and screeded concrete decks

14.17 Before applying the AVCL, a screed graded to the appropriate fall should be applied where necessary and, if adhering the AVCL and insulation boards, the whole deck treated with a suitable primer. The advice of the Certificate holder should be sought in respect of a suitable primer.

14.18 For adhered systems, the AVCL is fully bonded with hot bitumen, polyurethane adhesive or a suitable solvent-based adhesive and the laps sealed. The boards are applied in the manner described for timber decks (see sections 14.15 and 14.16).

Metal decks

14.19 If adhering the AVCL and insulation boards, the deck should be treated with a suitable primer before applying the AVCL. The advice of the Certificate holder should also be sought in respect of a suitable primer.

14.20 For adhered systems, the reinforced AVCL is fully bonded using hot bitumen, a polyurethane adhesive or a suitable solvent-based adhesive to the metal deck and the boards applied in the manner described for timber decks (see sections 14.15 and 14.16).

14.21 Boards are laid either with the long axis at right angles to the corrugations of the metal deck or diagonally across the corrugations of the deck, ensuring that all joints are supported on the crown flats of the decking.

14.22 The thickness of the board to be used is dependent on the width of the trough openings of the metal deck as indicated in Table 4.

Mechanical fixings

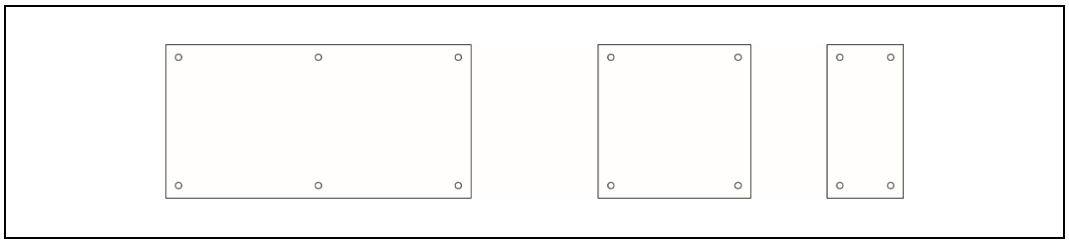
14.23 Alternatively, the boards can be secured to timber, metal, and concrete decks by means of mechanical fixings.

14.24 Each fixing should incorporate a minimum 50 mm by 50 mm square or 50 mm diameter circular plate countersunk washer, which must not restrain more than one board. The minimum number of fixings for each board size is given in Table 9 and shown in Figure 2, with the requirement of additional fixings assessed in accordance with BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005. These should be placed within the individual board area and be sited more than 50 mm and less than 150 mm from the edges and corners of the board, eg, giving a minimum fixing rate of 5.55 fixings per square metre for 1200 by 600 mm boards.

Table 7 *Minimum number of fixings (for solely mechanically fixed specification)*

Board dimensions (mm)	Minimum number of fixings
2400 x 1200	6
1200 x 1200	4
600 x 1200	4

Figure 2 Fixing layouts – minimum fixing numbers (for solely mechanically-fixed specification)



14.25 On tall buildings or in areas subject to high wind loads, additional mechanical fixings may be required(1). The suitability of the substrate to accept and retain mechanical fixings must be checked prior to the work commencing.

(1) The requirement for additional fixings must be assessed in accordance with BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005.

Technical Investigations

15 Tests

Tests were carried out by the BBA to determine:

- behaviour under variations in temperature (unrestrained)
- behaviour under distributed load and increased temperature
- bowing under the effect of a thermal gradient
- behaviour on exposure to moisture
- behaviour under concentrated loads in the middle of a free span.

16 Investigations

16.1 An examination was made of data relating to:

- density
- dimensional stability with temperature
- water vapour resistance/resistivity
- dimensional changes due to variations
- effect of concentrated load under a free span
- fire rating
- compressive strength
- thermal conductivity (initial and aged)
- dimensional accuracy
- dimensional variations in unrestrained panels
- behaviour under distributed load and increased in humidity temperature
- effect of immersion and heat ageing on compressive and tensile strength
- resistance to peel
- condensation risk
- adhesion.

16.2 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

16.3 Wind uplift testing has been conducted by the Certificate holder in accordance with BRL 1309 (Dutch National Assessment Guideline) for the Thermaroof TR26 boards fixed to a profiled steel deck substrate with various fixings. This data has been reviewed by the BBA and a copy can be obtained from the Certificate holder.

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BS 5250 : 2021 *Code of practice for control of condensation in buildings*

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BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8212 : 1995 *Code of practice for dry lining and partitioning using gypsum plasterboard*

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

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STN EN 1365-2 : 2000 *Fire resistance tests for loadbearing elements — Floors and roofs*
STN EN 1365-2 : 2001 *Fire resistance tests for loadbearing elements — Floors and roofs*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation, or person named on the front page – no other company, firm, organisation, or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- must be read, considered, and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care, and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation, or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain, or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship, and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship, and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance, and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance, and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained, and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.